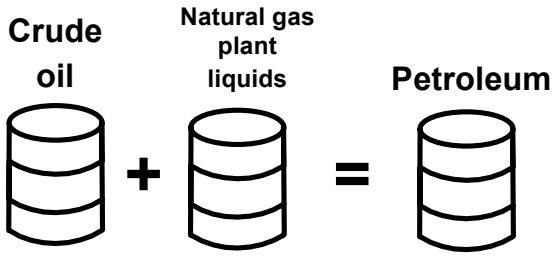
Chapter 1
Petroleum

Summary Statistics from Tables/Figures in this Chapter

Source			
Table 1.3	World Petroleum Production, 2001 (million barrels per day)		74.34
	U.S. Production (million barrels per day)		*7.67*
	U.S. Share		*10.3%*
Table 1.4	World Petroleum Consumption, 2001 (million barrels per day)		75.96
	U.S. Consumption (million barrels per day)		*19.65*
	U.S. Share		*25.9%*
Figure 1.5	Average refinery yield, 2001	OECD Europe	North America
	Gasoline	*20.4%*	*40.6%*
	Diesel fuel	*35.8%*	*23.3%*
	Residual fuel	*16.7%*	*7.7%*
	Kerosene	*6.2%*	*8.5%*
	Other	*20.9%*	*19.9%*
Table 1.12	U.S. transportation petroleum use as a percent of U.S. petroleum production, 2001		164.8%
Table 1.12	Net imports as a percentage of U.S. petroleum consumption, 2001		55.5%
Table 1.13	Transportation share of petroleum consumption, 2001		67.3%

In this document, petroleum is defined as crude oil (including lease condensate) and natural gas plant liquids.



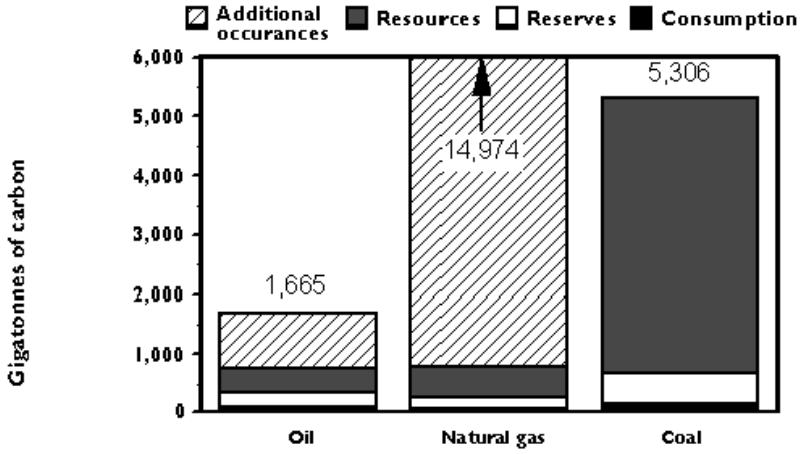
Although the world has consumed about 40% of estimated conventional oil resources, the total fossil fuel potential is huge. Methane hydrates–a potential source of natural gas–are included in the "additional occurrences" of unconventional natural gas, and constitute the largest resource.

Table 1.1
World Fossil Fuel Potential
(gigatonnes of carbon)

	Consumption (1860–1998)	Reserves	Resources	Additional occurrences
Oil				
Conventional	97	120	121	0
Unconventional	6	102	305	914
Natural Gas				
Conventional	36	83	170	0
Unconventional	1	144	364	14,176
Coal	155	533	4,618	[a]

Source:
Rogner, H.H., *World Energy Assessment: Energy and the Challenge of Sustainability, Part II*, Chapter 5, 2000, p. 149.

Figure 1.1. World Fossil Fuel Potential



Source:
See Table 1.1.

[a] Data are not available

In 2001, OPEC accounted for 42% of world oil production. Responding to low oil prices in early 2000, Mexico, Norway, Russia, and Oman joined OPEC in cutting production. This group of oil countries, referred to here as OPEC+, account for more than 62% of world oil production.

Table 1.2
World Crude Oil Production, 1960-2001[a]
(million barrels per day)

Year	United States	U.S. share	Total OPEC[b]	OPEC share	OPEC +[c]	OPEC +[c] share	Total non-OPEC	Persian Gulf nations[d]	Persian Gulf[d] share	World
1960	7.04	33.5%	8.70	41.4%	12.25	58.3%	12.29	5.27	25.1%	20.99
1965	7.80	25.7%	14.35	47.3%	19.83	65.4%	15.98	8.37	27.6%	30.33
1970	9.64	21.0%	23.30	50.8%	31.16	67.9%	22.59	13.39	29.2%	45.89
1975	8.37	15.8%	26.77	50.7%	37.56	71.1%	26.06	18.93	35.8%	52.83
1980	8.60	14.4%	26.61	44.6%	41.07	68.9%	32.99	17.96	30.1%	59.60
1985	8.97	16.6%	16.18	30.0%	31.81	58.9%	37.80	9.63	17.8%	53.98
1986	8.68	15.4%	18.28	32.5%	34.05	60.6%	37.95	11.70	20.8%	56.23
1987	8.35	14.7%	18.52	32.7%	34.72	61.3%	38.15	12.10	21.4%	56.67
1988	8.14	13.9%	20.32	34.6%	36.66	62.4%	38.42	13.46	22.9%	58.74
1989	7.61	12.7%	22.07	36.9%	38.50	64.3%	37.79	14.84	24.8%	59.86
1990	7.36	12.2%	23.20	38.3%	39.12	64.6%	37.37	15.28	25.2%	60.57
1991	7.42	12.3%	23.27	38.6%	38.53	64.0%	36.94	14.74	24.5%	60.21
1992	7.17	11.9%	24.40	40.5%	37.67	62.6%	35.81	15.97	26.5%	60.21
1993	6.85	11.4%	25.12	41.7%	37.65	62.5%	35.12	16.71	27.7%	60.24
1994	6.66	10.9%	25.51	41.8%	37.67	61.8%	35.48	16.96	27.8%	60.99
1995	6.56	10.5%	26.00	41.7%	38.24	61.4%	36.33	17.21	27.6%	62.33
1996	6.46	10.1%	26.46	41.5%	39.15	61.5%	37.25	17.37	27.3%	63.71
1997	6.45	9.8%	27.71	42.2%	40.69	61.9%	37.98	18.10	27.6%	65.69
1998	6.25	9.3%	28.77	43.0%	41.61	62.1%	38.19	19.34	28.9%	66.96
1999	5.88	8.9%	27.58	41.9%	40.48	61.4%	38.29	18.67	28.3%	65.87
2000	5.82	8.5%	29.11	42.7%	42.75	62.7%	39.09	19.94	29.2%	68.20
2001	5.80	8.5%	28.31	41.7%	42.57	62.6%	39.64	19.21	28.3%	67.96
					Average annual percentage change					
1960–2001	-0.5%		2.9%		3.1%		2.9%	3.2%		2.9%
1970–2001	-1.6%		0.6%		1.0%		1.8%	1.2%		1.3%
1991–2001	-2.4%		2.0%		1.0%		0.7%	2.7%		1.2%

Source:
U.S. Department of Energy, Energy Information Administration, *Annual Energy Review 2001,* Washington, DC, July 2002, Table 11.4.

[a]Includes lease condensate. Excludes natural gas plant liquids.
[b]Organization of Petroleum Exporting Countries. See Glossary for membership.
[c]OPEC+ includes all OPEC nations plus Russia, Mexico, Norway and Oman.
[d]See Glossary for Persian Gulf nations.

This table shows petroleum production, which includes both crude oil and natural gas plant liquids. The U.S. was responsible for 10.4% of the world's petroleum production in 2001, but only 8.5% of the world's crude oil production (Table 1.2).

Table 1.3
World Petroleum Production, 1973-2001[a]
(million barrels per day)

Year	United States	U.S. share	Total OPEC[b]	OPEC share	Total non-OPEC	Non-OPEC share	Persian Gulf nations[c]	Persian Gulf[d] share	World
1973	10.95	18.7%	30.95	52.9%	27.51	47.1%	20.86	35.7%	58.47
1974	10.44	17.8%	30.70	52.5%	27.81	47.5%	21.41	36.6%	58.51
1975	10.00	18.0%	27.14	48.8%	28.48	51.2%	19.18	34.5%	55.62
1976	9.73	16.2%	30.77	51.1%	29.43	48.9%	21.80	36.2%	60.21
1977	9.86	15.7%	31.37	50.0%	31.32	50.0%	22.07	35.2%	62.69
1978	10.28	16.3%	30.03	47.5%	33.21	52.5%	21.02	33.2%	63.24
1979	10.13	15.4%	31.22	47.3%	37.74	52.7%	21.53	32.6%	65.96
1980	10.17	16.1%	27.34	43.4%	35.70	56.6%	18.49	29.3%	63.04
1981	10.18	17.0%	23.31	39.0%	36.40	61.0%	15.85	26.5%	59.71
1982	10.20	17.9%	19.62	34.4%	37.48	65.6%	12.77	22.4%	57.11
1983	10.25	18.0%	18.28	32.1%	38.62	67.9%	11.63	20.4%	56.90
1984	10.51	18.0%	18.31	31.4%	40.05	68.6%	11.38	19.5%	58.36
1985	10.58	18.3%	17.07	29.5%	40.85	70.5%	10.28	17.7%	57.92
1986	10.23	16.9%	19.25	31.9%	41.13	68.1%	12.40	20.5%	60.38
1987	9.95	16.3%	19.53	32.0%	41.42	68.0%	12.82	21.0%	60.95
1988	9.77	15.4%	21.40	33.8%	41.82	66.2%	14.27	22.6%	63.22
1989	9.16	14.2%	23.26	36.1%	41.10	63.9%	15.69	24.4%	64.36
1990	8.92	13.7%	24.48	37.5%	40.72	62.5%	16.21	24.9%	65.20
1991	9.08	14.0%	24.57	37.8%	40.47	62.2%	15.67	24.1%	65.04
1992	8.87	13.6%	25.76	39.5%	39.42	60.5%	16.97	26.0%	65.18
1993	8.59	13.1%	26.56	40.6%	38.87	59.4%	17.75	27.1%	65.43
1994	8.39	12.7%	26.98	40.7%	39.31	59.3%	18.03	27.2%	66.29
1995	8.32	12.3%	27.51	40.6%	40.32	59.4%	18.32	27.0%	67.82
1996	8.29	12.0%	27.96	40.4%	41.33	59.6%	18.45	26.6%	69.30
1997	8.27	11.6%	29.30	41.0%	42.12	59.0%	19.25	27.0%	71.42
1998	8.01	11.0%	30.43	41.8%	42.41	58.2%	20.57	28.2%	72.84
1999	7.73	10.8%	29.23	40.7%	42.64	59.3%	19.82	27.6%	71.86
2000	7.73	10.4%	30.87	41.5%	43.58	58.5%	21.19	28.5%	74.45
2001	7.67	10.3%	30.02	40.4%	44.32	59.6%	20.42	27.5%	74.34
				Average annual percentage change					
1973–2001	-1.3%		-0.1%		1.7%		-0.1%		0.9%
1991–2001	-1.7%		2.0%		0.9%		2.7%		1.3%

Source:
U.S. Department of Energy, Energy Information Administration, *International Petroleum Monthly*, Tables 4.1 and 4.3.

[a]Includes natural gas plant liquids, crude oil and lease condensate.
[b]Organization of Petroleum Exporting Countries. See Glossary for membership.
[c]See Glossary for Persian Gulf nations.

The United States has accounted for approximately one-quarter of the world's petroleum consumption for the last two decades.

Table 1.4
World Petroleum Consumption, 1960–2001
(million barrels per day)

Year	United States	U.S. share	Total OECD[a]	Total non-OECD	World
1960	9.80	45.9%	15.78	5.56	21.34
1965	11.51	37.0%	22.81	8.33	31.14
1970	14.70	31.4%	34.49	12.32	46.81
1975	16.32	29.0%	38.82	17.38	56.20
1976	17.46	29.3%	41.39	18.28	59.67
1977	18.43	29.8%	42.43	19.40	61.83
1978	18.85	29.4%	43.62	20.54	64.16
1979	18.51	28.4%	44.01	21.21	65.22
1980	17.06	27.0%	41.41	21.66	63.07
1981	16.06	26.4%	39.14	21.76	60.90
1982	15.30	25.7%	37.45	22.05	59.50
1983	15.23	25.9%	36.59	22.15	58.74
1984	15.73	26.3%	37.43	22.40	59.83
1985	15.73	26.2%	37.23	22.86	60.09
1986	16.28	26.4%	38.28	23.48	61.76
1987	16.67	26.5%	38.96	24.04	63.00
1988	17.28	26.7%	40.24	24.58	64.82
1989	17.33	26.3%	40.88	25.04	65.92
1990	16.99	25.8%	40.92	25.05	65.97
1991	16.71	25.0%	41.40	25.16	66.56
1992	17.03	25.4%	42.42	24.34	66.76
1993	17.24	25.7%	42.98	24.02	67.00
1994	17.72	25.9%	44.17	24.12	68.29
1995	17.73	25.3%	44.96	24.92	69.88
1996	18.31	25.6%	46.07	25.34	71.41
1997	18.62	25.5%	46.63	26.22	72.85
1998	18.92	25.6%	46.89	26.71	73.60
1999	19.52	25.9%	47.69	27.29	74.98
2000	19.70	25.9%	47.92	27.61	75.53
2001	19.65	25.9%	47.68	28.28	75.96
			Average annual percentage change		
1960–2001	1.7%		2.7%	4.0%	3.1%
1970–2001	0.9%		1.1%	2.7%	1.6%
1991–2001	1.6%		1.4%	1.2%	1.3%

Source:
U.S. Department of Energy, Energy Information Administration, *Annual Energy Review 2001*, Washington, DC, July 2002, Table 11.9 and updates from the *International Petroleum Monthly*, July 2002.

[a] Organization for Economic Cooperation and Development. See Glossary for membership.

Figure 1.2. World Oil Reserves, Production and Consumption, 2001

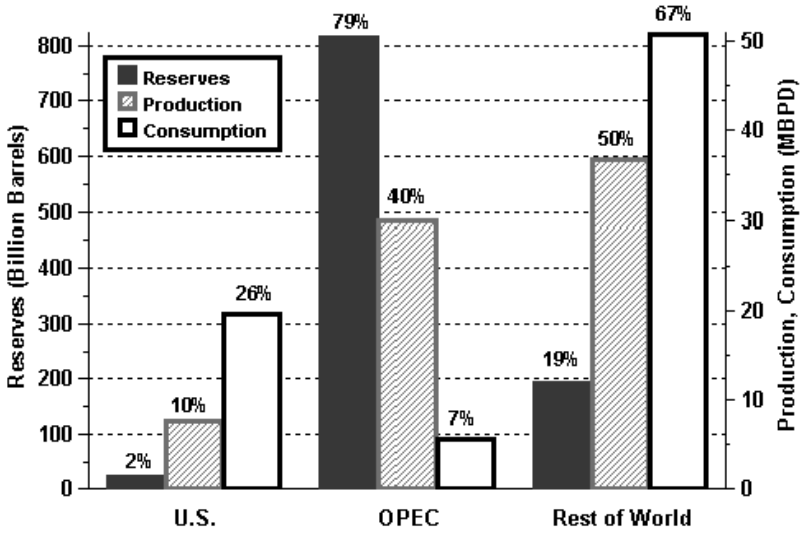


Table 1.5
World Oil Reserves, Production and Consumption, 2001

	Crude oil reserves (billion barrels)	Reserve share	Petroleum production (million barrels per day)	Production share	Petroleum consumption (million barrels per day)	Consumption share
U.S.	22.0	2%	7.7	10%	19.6	26%
OPEC	814.5	79%	30.0	40%	5.7	7%
Rest of world	191.6	19%	36.7	50%	50.7	67%

Source:
Reserves – Energy Information Administration, *International Energy Annual 2000*, Table 8.1.
Production – Energy Information Administration, *International Petroleum Monthly*, *April 2002*, Tables 4.1a – 4.1c and 4.3
Consumption – Energy Information Administration, *International Petroleum Monthly, April 2002*, Table 4.6.
OPEC consumption (2000 data) – Energy Information Administration, *International Energy Annual 2000*, Table 1.2.

Note:
Total consumption is higher than total production due to refinery gains including alcohol and liquid products produced from coal and other sources.
OPEC countries include Venezuela, Iran, Iraq, Kuwait, Qatar, Saudi Arabia, Unitead Arab Emirates, Algeria, Libya, Nigeria, and Indonesia.
OPEC consumption data are for 2000.

Total OECD government-owned petroleum stocks were slightly lower in 2001 than in 1995. The amount of petroleum held in government stocks is less than one-third that of commercial stocks.

Table 1.6
Petroleum Stocks of OECD Countries by Ownership, 1995–2001
(million barrels)

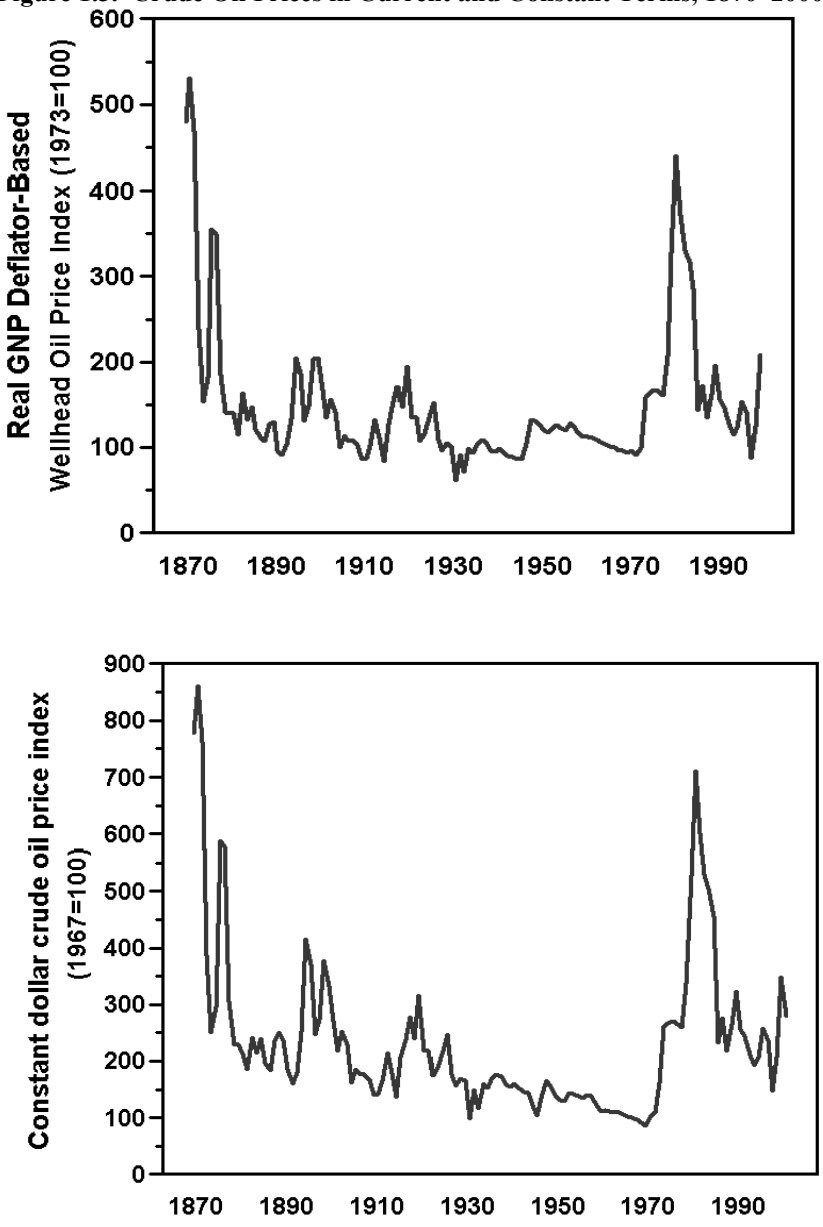
	OECD Europe		Japan		United States[a]		Total OECD[b]	
Year	Commercial	Government-owned	Commercial	Government-owned	Commercial	Government-owned	Commercial	Government-owned
1995	1,153	63	336	295	993	592	2,651	950
1996	1,191	63	351	300	969	566	2,659	929
1997	1,189	63	370	315	1,022	563	2,744	941
1998	1,257	63	334	315	1,098	571	2,851	949
1999	1,174	63	314	315	939	567	2,592	945
2000	1,196	64	322	312	951	541	2,635	917
2001	1,235	57	341	316	1,048	550	2,920	923
				Average annual percentage change				
1995–2001	1.2%	-1.7%	0.2%	1.2%	0.9%	-1.2%	1.6%	-0.5%

Source:
U.S. Department of Energy, Energy Information Administration, *International Petroleum Statistics Report*, April 2002, Table 1.6, and annual.

[a]Includes U.S. territories.
[b]Total OECD includes OECD Europe, Japan, United States, and other OECD countries. Look in the Glossary for a complete listing of OECD countries.

This chart shows the volatility of crude oil prices since 1870. Given this volatility, it is difficult for anyone to predict future crude oil prices with any certainty.

Figure 1.3. Crude Oil Prices in Current and Constant Terms, 1870–2000



Source:

1870–1972 Crude oil prices – American Petroleum Institute, *Basic Petroleum Data Book*, Volume XXI, Number 2, August 2001.

1973–2001 Crude oil prices – U.S. Department of Energy, Energy Information Administration, *Monthly Energy Review, April 2002*, DOE/EIA-0035(2002/04), Table 9.1, domestic first purchase price.

The share of petroleum imported to the U.S. can be calculated using total imports or net imports. Net imports, which is the preferred data, rose to 50% of U.S. petroleum consumption for the first time in 1998, while total imports reached 50% for the first time in 1993. OPEC share of net imports has been around 50% for the last five years.

Table 1.7
U.S. Petroleum Imports by World Region of Origin, 1960–2001
(million barrels per day)

Year	Net OPEC[a] imports	Net OPEC share	Net Persian Gulf nation[b] imports	Net Persian Gulf share	Net imports	Net imports as a share of U.S. products supplied	Total imports
1960	1.31	81.3%	[c]	[c]	1.61	[c]	1.82
1965	1.48	64.7%	[c]	[c]	2.28	[c]	2.47
1970	1.34	42.5%	[c]	[c]	3.16	[c]	3.42
1975	3.60	61.6%	[c]	[c]	5.85	35.8%	6.06
1980	4.29	67.5%	[c]	[c]	6.37	37.3%	6.91
1981	3.32	61.4%	1.22	22.5%	5.40	33.6%	6.00
1982	2.14	49.7%	0.69	16.1%	4.30	28.1%	5.11
1983	1.84	42.7%	0.44	10.2%	4.31	28.3%	5.05
1984	2.04	43.2%	0.50	10.6%	4.72	30.0%	5.44
1985	1.82	42.5%	0.31	7.2%	4.29	27.3%	5.07
1986	2.83	52.0%	0.91	16.7%	5.44	33.4%	6.22
1987	3.06	51.7%	1.07	18.2%	5.91	35.5%	6.68
1988	3.51	53.3%	1.53	23.2%	6.59	38.1%	7.40
1989	4.12	57.3%	1.86	25.8%	7.20	41.6%	8.06
1990	4.29	59.8%	1.96	27.4%	7.16	42.2%	8.02
1991	4.07	61.3%	1.83	27.7%	6.63	39.6%	7.63
1992	4.07	58.7%	1.77	25.6%	6.94	40.7%	7.89
1993	4.25	55.8%	1.77	23.3%	7.62	44.2%	8.62
1994	4.23	52.6%	1.72	21.4%	8.05	45.5%	9.00
1995	3.98	50.5%	1.56	19.8%	7.89	44.5%	8.84
1996	4.19	49.3%	1.60	18.8%	8.50	46.4%	9.48
1997	4.54	49.6%	1.75	19.1%	9.16	49.2%	10.16
1998	4.88	50.0%	2.13	21.8%	9.76	51.6%	10.71
1999	4.93	49.8%	2.46	24.8%	9.91	50.8%	10.85
2000	5.18	49.7%	2.48	23.8%	10.42	52.9%	11.46
2001	5.51	50.6%	2.76	25.3%	10.90	55.5%	11.87
			Average annual percentage change				
1960–2001	3.6%		[c]		4.8%		4.7%
1970–2001	4.7%		[c]		4.1%		4.1%
1991–2001	3.1%		4.2%		5.1%		4.5%

Source:
U.S. Department of Energy, Energy Information Administration, *Annual Energy Review 2001,* Washington, DC, July 2002, Tables 5.4 and 5.7 and updates from the *International Petroleum Monthly*, July 2002, Table 4.10.

[a] Organization of Petroleum Exporting Countries. See Glossary for membership.
[b] See Glossary for Persian Gulf nations.
[c] Data are not available.

The Costs of Oil Dependence

In the *Costs of Oil Dependence: A 2000 Update*, authors Greene and Tishchishyna indicate that the oil market upheavals caused by the OPEC cartel over the last 30 years have cost the U.S. in the vicinity of $7 trillion (present value 1998 dollars) in total economic costs, which is about as large as the sum total of payment on the national debt over the same period.

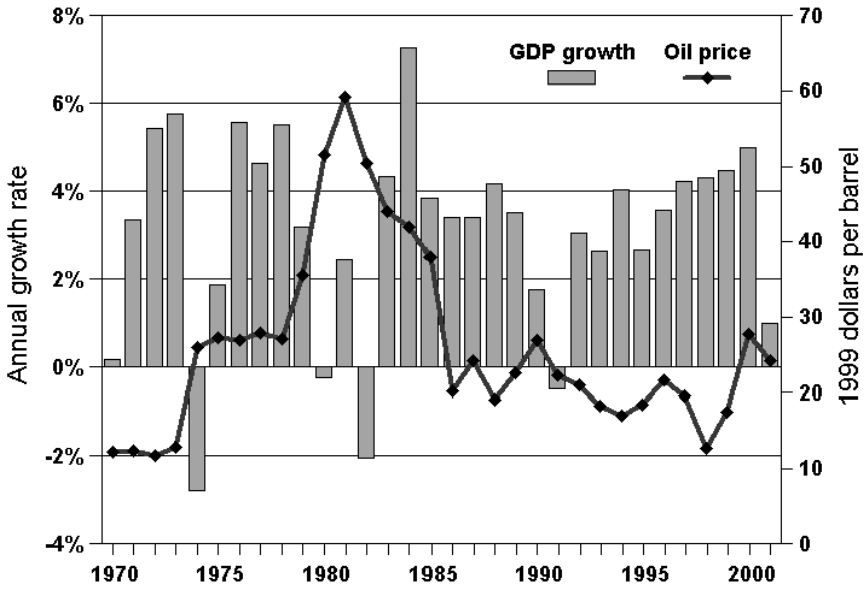
Oil dependence is the product of (1) a noncompetitive world oil market strongly influenced by the OPEC cartel, (2) high levels of U.S. oil imports, (3) oil's critical role in the U.S. economy, and (4) the absence of economical and readily available substitutes for oil. Transportation is key to the problem because transportation vehicles account for 68% of U.S. oil consumption and nearly all of the high-value light products that drive the market.

Oil consuming economies incur three types of costs when monopoly power is used to raise prices above competitive market levels:

- *Loss of potential gross domestic product (GDP)* - the economy's ability to produce is reduced because a key factor of production is more expensive;
- *Macroeconomic Adjustment Costs* - sudden changes in oil prices increase unemployment, further reducing economic output; and
- *Transfer of Wealth* - some of the wealth of oil consuming states is appropriated by foreign oil producers.

Major oil price shocks have disrupted world energy markets four times in the past 30 years (1973-74, 1979-80, 1990-91, 1999-2000). Each of the first three oil price shocks was followed by an economic recession in the U.S.

Figure 1.4. Oil Price and Economic Growth, 1970–2001[a]



Source:
Greene, D.L. and N. I. Tishchishyna, *Costs of Oil Dependence: A 2000 Update*, Oak Ridge National Laboratory, ORNL/TM-2000/152, Oak Ridge, TN, 2000, and data updates, 2001.
(Additional resources: www-cta.ornl.gov/publications)

[a]First two quarters of 2001.

Estimates of 1996 military expenditures for defending oil supplies in the Middle East range from $6 to $60 billion per year. This wide range in estimates reflects the difficulty in assigning a precise figure to the military cost of defending the U.S. interests in the Middle East. The two main reasons for the difficulty are 1) the Department of Defense does not divide the budget into regional defense sectors and 2) it is difficult to determine how much of the cost is attributable to defending Persian Gulf oil.

Table 1.8
Summary of 1996 Military Expenditures for Defending Oil Supplies from the Middle East

Source	Original estimates (billion dollars)	Year of original estimate	1996 estimate (constant 1996 billion dollars)
General Accounting Office [1]	$33	1990	$28[a]
Congressional Research Service [2]	$6.4	1990	$6[a]
Greene and Leiby [3]	$14.3	1990	$12[a]
Ravenal [4]	$50	1992	$60[b]
Kaufmann and Steinbruner [5]	$64.5	1990	$55[b]
Delucchi and Murphy[c] [6]	$20–40	1996	$20–40[b]
Average estimate is $32 billion, with a standard deviation of $22 billion.			

[1] U.S. General Accounting Offices, *Southwest Asia: Cost of Protecting U.S. Interests*, GAO/NSIAD-91-250, Washington, DC, August 1991.

[2] Congressional Research Service, *The External Costs of Oil Used in Transportation*, prepared for the U.S. Alternative Fuels Council, Washington, DC, June 1992.

[3] Greene, D.L., and P. Leiby, *The Social Costs to the U.S. of Monopolization of the World Oil Market*, 1972-1991, ORNL-6744, Oak Ridge National Laboratory, Oak Ridge, TN, March 1993.

[4] Ravenal, E.C., *Designing Defense for a New World Order: The Military Budget in 1992 and Beyond*, Cato Institute, Washington, DC, 1991.

[5] Kaufmann, W.W., and J.D. Steinbruner, *Decisions for Defense: Prospects for a New Order*, The Brookings Institution, Washington, DC, 1991.

[6] Delucchi, M.A., and J. Murphy, *U.S. Military Expenditures to Protect the Use of Persian-Gulf Oil for Motor Vehicles*, UCD-ITS-RR-96-3 (15), University of California, Davis, California, April 1996.

Source:
Hu, P.S., "Estimates of 1996 U.S. Military Expenditures on Defending Oil Supplies from the Middle East: A Literature Review," Oak Ridge National Laboratory, Oak Ridge, TN, March 1996.

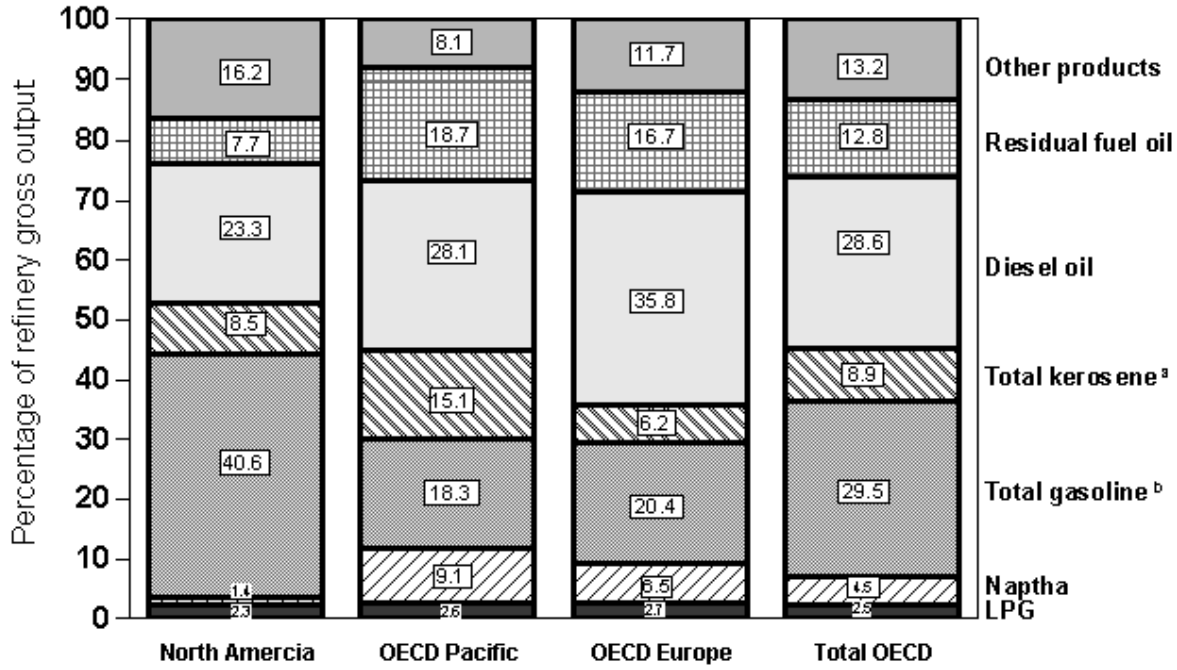
[a]Estimated based on a 3% annual inflation rate and a decrease of 30% in the total Defense budget from 1990 to 1996.

[b]Provided by the author(s); thus, assumptions used for the projection are different from those used in the other estimates.

[c]Annual cost to defend all U.S. interests in the Persian Gulf.

Other parts of the world refine crude oil to produce more diesel fuel and less gasoline than does North America. The OECD Pacific countries produce the lowest share of gasoline.

Figure 1.5. Refinery Gross Output by World Region, 2001



Source:
International Energy Agency, *Monthly Oil Survey*, January 2002, Paris, France, Table 7.

[a] Includes jet kerosene and other kerosene.
[b] Includes motor gasoline, jet gasoline, and aviation gasoline.
[c] Organization for Economic Cooperation and Development. See Glossary for membership.

Oxygenate refinery input increased significantly in 1995, most certainly due to the Clean Air Act Amendments of 1990 which mandated the sale of reformulated gasoline in certain areas beginning in January 1995.

Table 1.9
U.S. Refinery Input of Crude Oil and Petroleum Products, 1987–2001
(thousand barrels)

			Oxygenates						
Year	Crude oil	Natural gas liquids	Fuel ethanol	Methanol	MTBE[a]	Other oxygenates[b]	Other hydrocarbons[c]	Other liquids	Total input to refineries
1987	4,691,783	280,889	[d]	[d]	[d]	[d]	23,304	220,296	5,105,392
1990	4,894,379	170,589	[d]	[d]	[d]	[d]	28,642	231,466	5,325,076
1991	4,855,016	172,306	[d]	[d]	[d]	[d]	31,574	248,691	5,307,587
1992	4,908,603	171,701	[d]	[d]	[d]	[d]	47,918	224,758	5,352,980
1993	4,968,641	179,213	3,351	782	49,393	1,084	15,543	264,531	5,482,538
1994	5,061,111	169,868	3,620	242	52,937	1,676	14,130	179,678	5,483,262
1995	5,100,317	172,026	9,055	246	79,396	3,876	14,668	175,743	5,555,327
1996	5,195,265	164,552	11,156	126	79,407	3,444	20,587	193,695	5,668,232
1997	5,351,466	151,769	11,803	496	86,240	3,750	22,976	178,292	5,806,792
1998	5,434,383	146,921	11,722	675	89,362	3,363	22,759	183,376	5,892,561
1999	5,403,450	135,756	13,735	813	94,784	3,334	21,447	204,332	5,877,651
2000	5,514,395	138,921	15,268	854	90,288	3,151	24,488	176,647	5,964,012
2001	5,521,637	156,479	16,929	1,431	87,116	3,113	24,903	167,729	5,979,337
			Average annual percentage change						
1987-2001	1.2%	-4.1%	[e]	[e]	[e]	[e]	0.5%	-1.9%	1.1%
1993-2001	1.3%	-1.7%	22.4%	7.8%	7.4%	14.1%	6.1%	-5.5%	1.1%

Source:
U.S. Department of Energy, Energy Information Administration, *Petroleum Supply Annual, 2001*, Vol. 1, June 2002, Table 16, and annual.
(Additional resources: www.eia.doe.gov)

[a]Methyl tertiary butyl ether (MTBE).
[b]Includes ethyl tertiary butyl ether (ETBE), tertiary amyl methyl ether (TAME), tertiary butyl alcohol (TBA), and other aliphatic alcohols and ethers intended for motor gasoline blending.
[c]For 1987–92, includes other hydrocarbons/hydrogen/oxygenates. For 1993–on, includes other hydrocarbons/hydrogen.
[d]Reported in "Other hydrocarbons" category in this year.
[e]Data are not available.

When crude oil and other hydrocarbons are processed into products that are, on average, less dense than the input, a processing volume gain occurs. Due to this gain, the product yield from a barrel of crude oil is more than 100%. The processing volume gain has been growing over the years.

Table 1.10
Refinery Yield of Petroleum Products from a Barrel of Crude Oil, 1978–2001
(percentage)

Year	Motor gasoline	Distillate fuel oil	Jet fuel	Liquified petroleum gas	Other[a]	Total[b]
1978	44.1	21.4	6.6	2.3	29.6	104.0
1979	43.0	21.5	6.9	2.3	30.3	104.0
1980	44.5	19.7	7.4	2.4	30.0	104.0
1981	44.8	20.5	7.6	2.4	28.7	104.0
1982	46.4	21.5	8.1	2.2	26.2	104.4
1983	47.6	20.5	8.5	2.7	24.8	104.1
1984	46.7	21.5	9.1	2.9	24.2	104.4
1985	45.6	21.6	9.6	3.1	24.6	104.5
1986	45.7	21.2	9.8	3.2	24.8	104.7
1987	46.4	20.5	10.0	3.4	24.5	104.8
1988	46.0	20.8	10.0	3.6	24.4	104.8
1989	45.7	20.8	10.1	4.0	24.2	104.8
1990	45.6	20.9	10.7	3.6	24.1	104.9
1991	45.7	21.3	10.3	3.8	24.1	105.2
1992	46.0	21.2	9.9	4.3	24.0	105.4
1993	46.1	21.9	10.0	4.1	23.3	105.4
1994	45.5	22.3	10.1	4.2	23.2	105.3
1995	46.4	21.8	9.7	4.5	22.9	105.3
1996	45.7	22.7	10.4	4.5	22.4	105.7
1997	45.7	22.5	10.3	4.6	22.5	105.6
1998	46.2	22.3	10.4	4.4	22.5	105.8
1999	46.5	22.3	10.2	4.5	22.3	105.8
2000	46.2	23.1	10.3	4.5	22.0	106.1
2001	46.2	23.8	9.8	4.3	21.7	105.8

Source:
Department of Energy, Energy Information Administration, *Petroleum Supply Annual 2001*, Vol. 1, June 2002, Table 19 and annual. (Additional resources: www.eia.doe.gov)

[a] Includes aviation gasoline(0.1%), kerosene (0.5%), naphtha and other oils for petrochemical feedstock use (2.2%), special naphthas (0.3%), lubricants (1.1%), waxes (0.1%), petroleum coke (4.9%), asphalt and road oil (3.1%), still gas (4.3%), and miscellaneous products (0.4%).
[b] Products sum greater than 100% due to processing gain. The processing gain for years 1978 to 1980 is assumed to be 4%.

Most of the petroleum imported by the United States is in the form of crude oil. The U.S. does export small amounts of petroleum, mainly refined petroleum products which go to Canada and Mexico.

Table 1.11
United States Petroleum Production, Imports and Exports, 1950–2001
(million barrels per day)

	Domestic Production			Net Imports			Exports		
	Crude oil	Natural gas plant liquids	Total[a]	Crude oil	Petroleum products	Total	Crude oil	Petroleum products	Total
1950	5.41	0.50	5.91	0.39	0.15	0.55	0.10	0.21	0.30
1955	6.81	0.77	7.58	0.75	0.13	0.88	0.03	0.34	0.37
1960	7.05	0.93	7.99	1.01	0.61	1.62	0.01	0.19	0.20
1965	7.80	1.21	9.01	1.24	1.05	2.28	0.00	0.18	0.19
1970	9.64	1.66	11.30	1.31	1.85	3.16	0.01	0.25	0.26
1975	8.37	1.63	10.05	4.10	1.75	5.85	0.01	0.20	0.21
1980	8.62	1.58	10.24	4.99	1.39	6.38	0.29	0.26	.055
1981	8.57	1.61	10.23	4.17	1.23	5.40	0.23	0.37	0.59
1982	8.65	1.55	10.25	3.25	1.05	4.30	0.24	0.58	0.82
1983	8.69	1.56	10.30	3.17	1.15	4.31	0.16	0.58	0.74
1984	8.90	1.63	10.58	3.25	1.47	4.73	0.18	0.54	0.72
1985	8.97	1.61	10.64	3.00	1.29	4.29	0.20	0.58	0.78
1986	8.68	1.55	10.29	4.02	1.41	5.44	0.15	0.63	0.78
1987	8.35	1.60	10.01	4.52	1.39	5.91	0.15	0.61	0.76
1988	8.16	1.63	9.84	4.97	1.64	6.60	0.16	0.66	0.82
1989	7.61	1.55	9.22	5.70	1.50	7.20	0.14	0.72	0.86
1990	7.36	1.56	8.99	5.79	1.38	7.16	0.11	0.75	0.86
1991	7.42	1.66	9.17	5.67	0.96	6.63	0.12	0.88	1.00
1992	7.19	1.70	9.02	6.01	0.95	6.96	0.09	0.86	0.95
1993	6.85	1.74	8.84	6.69	0.93	7.62	0.10	0.90	1.00
1994	6.66	1.73	8.64	6.96	1.09	8.05	0.10	0.84	0.94
1995	6.56	1.76	8.63	7.14	0.75	7.89	0.09	0.85	0.95
1996	6.48	1.84	8.63	7.42	1.10	8.52	0.11	0.87	0.98
1997	6.45	1.82	8.61	8.12	1.04	9.16	0.11	0.90	1.00
1998	6.25	1.76	8.39	8.60	1.17	9.76	0.11	0.83	0.94
1999	5.88	1.85	8.11	8.61	1.30	9.91	0.12	0.82	0.94
2000	5.85	1.91	8.15	8.91	1.17	10.08	0.05	0.99	1.04
2001	5.85	1.86	8.10	9.12	1.51	10.64	0.02	0.96	0.98
	Average annual percentage change								
1950–2001	0.2%	2.6%	0.6%	6.4%	4.6%	6.0%	-3.1%	3.0%	2.3%
1970–2001	-1.5%	0.4%	-1.1%	6.5%	-0.7%	4.0%	2.3%	4.4%	4.4%
1991–2001	-2.3%	1.1%	-1.2%	4.9%	4.6%	4.8%	-16.4%	0.9%	-0.2%

Source:
U.S. Department of Energy, Energy Information Administration, *Annual Energy Review 2001*, July 2002, Tables 5.1 and 5.5

[a]Total domestic production includes crude oil, natural gas plant liquids and small amounts of other liquids.

The U.S. share of the world's petroleum consumption is approximately one-quarter. The U.S. relies heavily on imported petroleum. Imports accounted for 55% of U.S. petroleum consumption in 2001.

Table 1.12
Petroleum Production and Consumption Ratios, 1950–2001

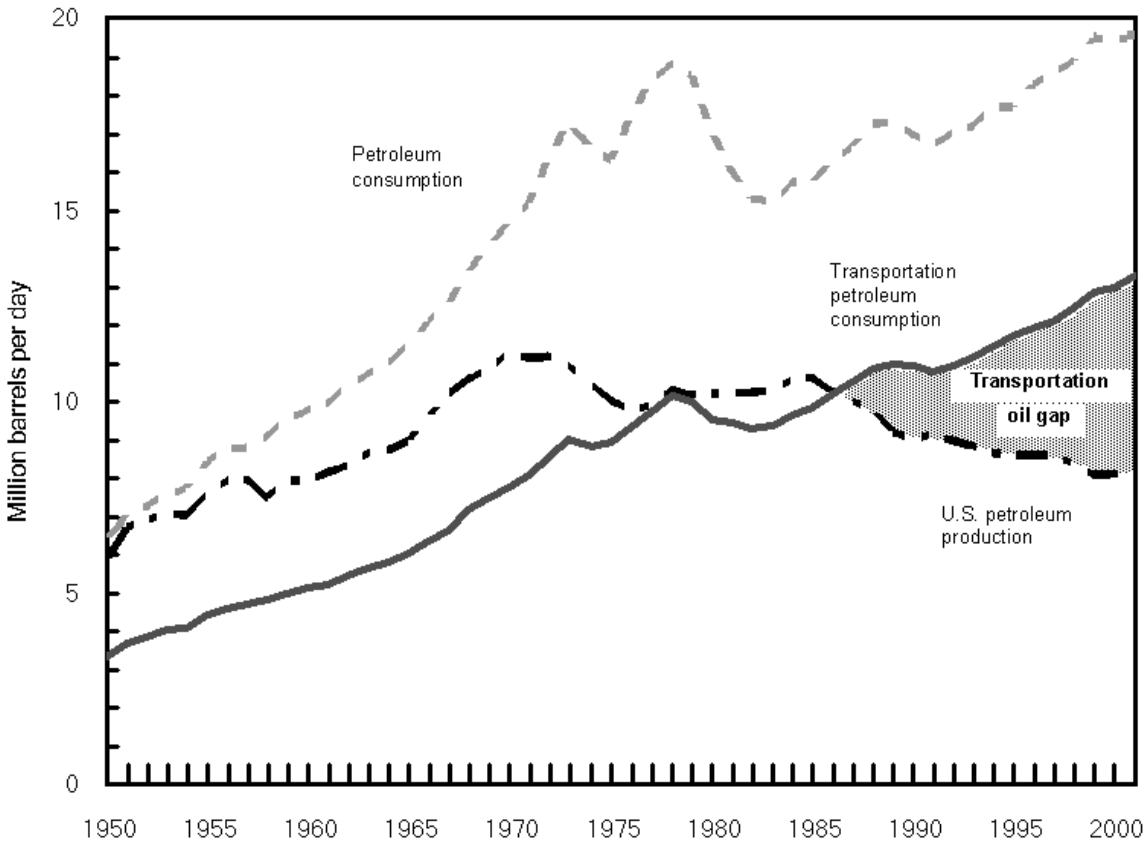
	Domestic petroleum production[a]	Net petroleum imports	Transportation petroleum consumption	U.S. petroleum consumption	World petroleum consumption	Net imports as a share of U.S. consumption	U.S. petroleum consumption as a share of world consumption	Transportation petroleum use as a share of domestic production
	(million barrels per day)							
1950	5.91	0.55	3.36	6.46	[b]	8.4%	[b]	56.8%
1955	7.58	0.88	4.46	8.46	[b]	10.4%	[b]	58.8%
1960	7.99	1.62	5.15	9.82	21.34	16.5%	46.0%	64.5%
1965	9.01	2.28	6.04	11.51	31.14	19.8%	37.0%	67.0%
1970	11.30	3.16	7.78	14.70	46.81	21.5%	31.4%	68.9%
1975	10.05	5.85	8.95	16.32	56.20	35.8%	29.0%	89.1%
1980	10.24	6.38	9.57	17.10	63.07	37.3%	27.1%	93.5%
1981	10.23	5.40	9.49	16.06	60.90	33.6%	26.4%	92.7%
1982	10.25	4.30	9.31	15.30	59.50	28.1%	25.7%	90.8%
1983	10.30	4.31	9.41	15.23	58.74	28.3%	25.9%	91.3%
1984	10.58	4.73	9.71	15.77	59.84	30.0%	26.4%	91.8%
1985	10.64	4.29	9.85	15.73	60.10	27.3%	26.2%	92.6%
1986	10.29	5.44	10.23	16.28	61.76	33.4%	26.4%	99.5%
1987	10.01	5.91	10.53	16.67	63.00	35.5%	26.5%	105.2%
1988	9.84	6.60	10.90	17.33	64.82	38.1%	26.7%	110.8%
1989	9.22	7.20	11.01	17.33	65.92	41.6%	26.3%	119.5%
1990	8.99	7.16	10.97	16.99	65.98	42.2%	25.7%	122.0%
1991	9.17	6.63	10.80	16.71	66.73	39.6%	25.0%	117.8%
1992	9.02	6.96	10.98	17.08	66.94	40.7%	25.5%	121.7%
1993	8.84	7.62	11.18	17.24	67.14	44.2%	25.7%	126.6%
1994	8.64	8.05	11.49	17.72	68.44	45.5%	25.9%	132.9%
1995	8.63	7.89	11.73	17.72	70.04	44.5%	25.3%	136.0%
1996	8.63	8.52	11.99	18.36	71.60	46.4%	25.6%	139.0%
1997	8.61	9.16	12.13	18.62	73.06	49.2%	25.5%	140.9%
1998	8.39	9.76	12.48	18.92	73.79	51.6%	25.6%	148.8%
1999	8.11	9.91	12.89	19.52	75.30	50.8%	25.9%	159.0%
2000	8.11	10.42	13.25	19.70	76.02	52.9%	25.9%	163.4%
2001	8.05	10.90	13.26	19.65	[b]	55.5%	[b]	164.8%
	Average annual percentage change							
1950–2001	0.6%	6.0%	2.7%	2.2%	[b]			
1970–2001	-1.1%	4.1%	1.7%	0.9%	1.6%[c]			
1991–2001	-1.3%	5.1%	2.1%	1.6%	1.3%[c]			

Source:
U.S. Department of Energy, Energy Information Administration, *Monthly Energy Review 2001*, Tables 2.5, 3.1a, 3.1b, and A3. (Pre-1973 data from the *Annual Energy Review*).
World petroleum consumption - U.S. Department of Energy, Energy Information Administration, *International Energy Annual 2000*, May 2002, Table 1.1, and annual.

[a]Total domestic production includes crude oil, natural gas plant liquids and small amounts of other liquids.
[b]Data are not available.
[c]Average annual percentage change is to the latest year possible.

The transportation oil gap is the difference between the amount of petroleum the U.S. produces and the amount of petroleum used by the transportation sector. This gap has been getting wider not only due to increasing transportation demand, but also due to decreasing U.S. petroleum production.

Figure 1.6. United States Petroleum Production and Consumption, 1950–2001



Source:
See Table 1.11.

Transportation accounts for more than two-thirds of the U.S. petroleum use. The residential sector and the commercial sector data which were previously combined are now available separately.

Table 1.13
Consumption of Petroleum by End-Use Sector, 1973–2001
(million barrels per day)

Year	Transportation	Percentage	Residential	Commercial	Industrial	Electric utilities	Total
1973	9.05	52.3%	1.49	0.75	4.48	1.54	17.31
1974	8.84	53.1%	1.36	0.68	4.30	1.48	16.65
1975	8.95	54.8%	1.32	0.63	4.04	1.39	16.32
1976	9.37	53.7%	1.43	0.70	4.45	1.52	17.46
1977	9.76	53.0%	1.42	0.72	4.82	1.71	18.43
1978	10.16	53.9%	1.38	0.69	4.87	1.75	18.85
1979	10.01	54.1%	1.09	0.63	5.34	1.44	18.51
1980	9.55	56.0%	0.91	0.61	4.84	1.15	17.06
1981	9.49	59.1%	0.81	0.52	4.27	0.96	16.06
1982	9.31	60.8%	0.76	0.48	4.06	0.69	15.30
1983	9.41	61.8%	0.74	0.55	3.85	0.68	15.23
1984	9.68	61.5%	0.71	0.57	4.19	0.56	15.73
1985	9.85	62.6%	0.79	0.50	4.10	0.48	15.73
1986	10.23	62.8%	0.78	0.53	4.11	0.64	16.28
1987	10.53	63.2%	0.81	0.52	4.25	0.55	16.67
1988	10.88	63.0%	0.83	0.50	4.39	0.68	17.28
1989	11.01	63.5%	0.84	0.47	4.26	0.74	17.33
1990	10.97	64.6%	0.70	0.44	4.32	0.55	16.99
1991	10.80	64.6%	0.72	0.42	4.25	0.52	16.71
1992	10.95	64.3%	0.73	0.40	4.55	0.42	17.03
1993	11.18	64.8%	0.77	0.37	4.45	0.46	17.24
1994	11.49	64.8%	0.74	0.37	4.69	0.43	17.72
1995	11.73	66.2%	0.76	0.35	4.60	0.29	17.72
1996	11.96	65.3%	0.84	0.37	4.82	0.32	18.31
1997	12.13	65.1%	0.82	0.36	4.97	0.36	18.62
1998	12.48	66.0%	0.75	0.33	4.84	0.51	18.92
1999	12.89	66.0%	0.84	0.34	5.03	0.42	19.52
2000	13.25	67.1%	0.86	0.37	4.93	0.34	19.75
2001	13.26	67.3%	0.85	0.36	4.86	0.37	19.70
			Average annual percentage change				
1973–2001	1.4%		-2.0%	-2.6%	0.0%	-5.0%	0.5%
1991–2001	2.1%		1.7%	-1.5%	1.4%	-3.3%	1.7%

Source:
U.S. Department of Energy, Energy Information Administration, *Monthly Energy Review,* March 2002, Tables 2.2–2.6. Converted to million barrels per day using Table A3. (Additional resources: www.eia.doe.gov)

Pipelines accounted for two-thirds of the domestic movement of petroleum and petroleum products in 2000.

Table 1.14
Ton-Miles of Petroleum and Petroleum Products in the U.S. by Mode, 1975–2000

Year	Pipelines[a]	Water carriers	Motor carriers[b]	Railroads	Total
	(percent)				(billion ton-miles)
1975	59.9%	35.2%	3.3%	1.7%	846.7
1976	59.4%	35.4%	3.8%	1.5%	867.7
1977	59.1%	36.1%	3.2%	1.6%	923.4
1978	50.5%	45.7%	2.7%	1.1%	1,160.2
1979	51.8%	44.5%	2.6%	1.2%	1,174.8
1980	47.2%	49.6%	2.2%	1.0%	1,245.3
1981	46.3%	50.7%	2.0%	1.0%	1,218.4
1982	46.4%	50.6%	1.9%	1.1%	1,218.2
1983	45.5%	51.5%	2.1%	1.0%	1,223.5
1984	48.1%	48.4%	2.5%	1.0%	1,180.2
1985	47.2%	49.4%	2.4%	1.0%	1,195.5
1986	48.7%	47.8%	2.5%	1.0%	1,187.8
1987	49.1%	47.4%	2.5%	1.0%	1,195.8
1988	50.6%	45.8%	2.6%	1.1%	1,188.1
1989	53.4%	42.6%	2.8%	1.2%	1,094.2
1990	54.2%	41.7%	2.8%	1.3%	1,076.8
1991	53.3%	42.8%	2.7%	1.3%	1,086.1
1992	53.9%	42.1%	2.6%	1.4%	1,091.7
1993	57.3%	38.8%	2.4%	1.5%	1,034.6
1994	56.5%	39.3%	2.7%	1.5%	1,046.7
1995	57.5%	38.4%	2.5%	1.6%	1,044.9
1996	60.6%	34.9%	2.9%	1.6%	1,022.2
1997	64.5%	30.9%	2.9%	1.8%	956.5
1998	66.7%	28.5%	3.0%	1.8%	929.8
1999	67.7%	27.1%	3.2%	2.1%	912.9
2000	66.1%	28.0%	3.6%	2.3%	873.3
	Average annual percentage change				
1975–2000					0.1%
1990–2000					-2.1%

Source:
Association of Oil Pipelines, *Shifts in Petroleum Transportation*, Washington, DC, February 2002, Table 1.

[a] The amounts carried by pipeline are based on ton-miles of crude and petroleum products for Federally regulated pipelines (84 percent) plus an estimated breakdown of crude and petroleum products of the ton-miles for pipelines not Federally regulated (16 percent).

[b] The amounts carried by motor carriers are estimated.